

# Regulating oil tankers in Canadian waters

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## Abstract:

On the west coast of Canada, environmental concerns have prompted recent legislative attempts to ban or limit oil tanker traffic over large portions of Canadian waters. The rising tide of popular sentiment is fuelled by the belief that a tanker ban is the only way to prevent an oil spill from damaging the marine environment. Seldom included in the debate is any analysis of the consistency of Canada's oil tanker policy.

This article will explore the specific policy commitments that govern deep-sea tanker shipping in Canada. It will outline some of the outcomes of the present safety and environmental framework that govern bulk oil shipments, and review the measures that are permitted under the law to deal with those concerned about tanker traffic. The article will conclude by considering how existing commitments affect Canada's ability to ban oil tanker traffic and the consequences that the policy choices could have on Canadian energy security and international trade interests.

## Domestic maritime legislation in Canada

Canada is the world's largest coastal nation with 244,000 km of coastline under its jurisdiction. The economy is dependent on the free flow of goods by air, land, pipeline and sea. Under the *Constitution Act 1867*, the federal government is given power over navigation and shipping and enacted the *Canada Shipping Act 2001*, which sets out a variety of requirements for a wide range of maritime-related activities including salvage, pollution response, and pollution prevention standards.

Transport Canada Marine Safety administers the *Canada Shipping Act* and other federal statutes and has a vigorous port state control regime in place to investigate foreign-flagged vessels to ensure compliance and reduce substandard ships.<sup>1</sup>

The *Canada Shipping Act* allows vessel traffic management schemes to regulate navigation in Canadian waters. These are shore-based systems, not unlike air traffic control, in which vessel controllers provide information and navigational advice (although it is not prescriptive). Many areas along the Canadian coastline are subject to vessel traffic management schemes that are administered by the Canadian Coast Guard. Recently Canada made the Northern Canada Vessel Traffic Services requirements compulsory in the Arctic. The international community, who regard the Northwest Passage as an international strait and not subject to Canadian control, have contested the application of these requirements to foreign-flagged vessels.

Federal parliamentarians have engaged in a number of recent attempts to modify Canada's existing commitments by introducing private member-sponsored legislation to ban oil tanker traffic. The legislation, Bill C-458, introduced in 2009, sought to amend the *Canada Shipping Act* to prohibit oil tankers in Dixon Entrance, Hecate Strait and Queen Charlotte Sound on Canada's north Pacific coast. In 2010, Bill C-606 was introduced into the House of Commons, in an attempt to amend the *Canada Shipping Act* to prohibit the transport of oil by tankers in a large section of Canadian waters. The proposed legislative changes were introduced into a contentious public policy context that was reacting to the 2010 US Gulf Coast Oil spill, the report of the Commissioner of the Environment and Sustainable

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Development on *Oil Spills from Ships* prepared for Canada’s Auditor General, the Enbridge Northern Gateway project application to the National Energy Board and increased tanker traffic from Port Metro Vancouver arising from the Kinder Morgan Trans Mountain pipeline originating in Alberta.

In 2011 Bill C-485 was reintroduced as Bill C-21. Normally with federal legislation in Canada, a regulatory analysis occurs that examines the impact of the proposed legislation and its costs and benefits. In addition, there is also consultation with stakeholders to look at the issue in its entirety so proposed legislation can be improved. Superimposed on this process are the international obligations that also need due consideration. Unfortunately, the three most recent private member’s bills fell short in these regards but were applauded nonetheless in the general media and by some members of the public, environmental groups and First Nations.

### Canada’s existing oil tanker movement regime

Canadian oil tanker movements are governed within a framework that balances the freedom of navigation, the right of coastal states to protect the environment and the regulation of shipping activity. Reviewing the magnitude of present operations and future activity is necessary to understand the potential impact of policy choices.

The bulk transportation of crude oil in Canada has predominately relied on pipelines and maritime modes. In 2010 there were 18 operating oil refineries in Canada, with three main centres of operation Edmonton, Sarnia and Montreal.

Due to logistics and transportation costs, the Canadian refineries located mainly in Quebec and the Atlantic Provinces, import roughly half of their crude supplies from overseas and rely on maritime transportation to reach Canadian shores. Thus, to meet refinery demands, Canada’s crude petroleum movements include cargo originating from domestic and international markets. The balance of crude petroleum refinery supply in Canada is 52 per cent from Western Canada, 44 per cent imported and 4 per cent from eastern Canada.<sup>2</sup> As the single largest commodity handled within the Canadian marine transportation system, crude petroleum represents almost 20 per cent of the total tonnage.<sup>3</sup> On the export side Canada primarily participates in North American markets and, to a significantly lesser extent, other markets—a pattern that is changing. Table 1 illustrates the major crude oil tanker ports and the crude petroleum trade flow in Canada.

Port	Domestic		International		Total Handled
	Loaded	Unloaded	Loaded	Unloaded	
Come-By-Chance	3,007.3	10,131.2	6,881.2	4,932.8	24,952.5
Port Hawkesbury	0	3,369.9	10,674.9	7,153.3	21,198.1
Newfoundland Offshore	14,949.1	0	1,919.3	0	16,868.3
Saint John	0	2,798.7	28.4	10,511.5	12,338.5
Quebec	0	0	0	9,631.8	9,631.8
Port Metro Vancouver	0	0	2,159.3	0	2,153.3

Table 1: Canadian crude petroleum in 2008 ('000 tonnes)

As Table 1 clearly shows, Canadians in Atlantic Canada and Quebec are heavily dependent on international shipping and oil tanker traffic for meeting their needs.<sup>4</sup> Since the Atlantic region and the Gulf of St Lawrence and the Seaway system transverse environmentally important areas, it is useful to consider the effectiveness of the existing governance

framework since an outright tanker ban in these areas would place the energy security requirements of a large number of Canadians at risk.

The risk associated with the maritime transport of crude petroleum is primarily a function of both the absolute number of ship movements and the volume of cargo transported. Before examining Canadian data, it is useful to consider the worldwide safety performance of the industry: 99.9 per cent of oil transported by ship arrived safely and the total volume of cargo involved in oil spills declined significantly while the total tonnes of cargo increased.<sup>5</sup> The International Tanker Owners Pollution Federation reported that 2011 was a record year for the lowest number of spills incidences and the lowest amount of oil spilt.<sup>6</sup>

Together with the skills of highly dedicated and professional mariners, there are several policy tools in place internationally to ensure maritime transport safety and environmental protection. One of the most important provisions is the requirement for compulsory marine pilotage, to reduce the number of marine incidents that give could give rise to an accident. The *Pilotage Act* mandates compulsory pilotage in certain areas in Canada’s coastal waters, with three separate pilotage agencies that govern shipping in Canadian waters. These three are administered through a federal agency that in the case of the west coast is the Pacific Pilotage Authority. The statutes require a pilot on board to give the master of the foreign-flagged vessel navigation advice. The pilots are highly skilled mariners with detailed knowledge of their local waters. These compulsory pilotage services have been credited with the low level of marine incidents on all coasts. Table 2 below illustrates the Canada has over a 99.8 per cent incident free rate of pilotage assignments.

	<b>Atlantic (2009)</b>	<b>Laurentian (2008)</b>	<b>Great Lakes (2009)</b>	<b>Pacific (2009)</b>
<b>Incident Free Rate (%)</b>	99.9	99.9	99.8	99.9
<b>Assignments</b>	9,063	22,658	4,217	11,065
<b>Tanker Assignments</b>	4,015	-	-	870

*Table 2: Marine Pilotage Incident Free Assignment Rate<sup>7</sup>*

While the absolute number of commercial shipping accidents is very low it is nevertheless important to analyse the type of marine accidents that do arise, given the fact that a large-scale incident, or Black Swan event, has the potential to cause significant environmental damage. Data from the Transportation Safety Board of Canada provides important insights into the type, frequency and distribution of maritime incidents, and for the period 2000 to 2009, accidents aboard ships for tankers averaged 10.1 incidents a year out of total of 422.4 incidents across Canada in the five main regions.<sup>8</sup>

<b>Shipping Accidents</b>	<b>Newfoundland Region</b>	<b>Maritime Region</b>	<b>Laurentian Region</b>	<b>Central Region</b>	<b>Western Region</b>
<b>Tankers</b>	0.6	1.0	5.3	3.1	0.1
<b>All vessels</b>	62.4	100.2	72.5	56.6	130.7

*Table 3: Average Number of Marine Occurrences by Region (2000 to 2009)*

The types of incident reported include close-quarters situations; engine/rudder/propeller issues; cargo trouble; personal incidents and other incidents. The absolute number of marine occurrences by region is summarised in the Table 3. Tankers were involved in 2.4 per cent of marine occurrences across the country.

*Atlantic Canada, the Saint Lawrence Seaway/Great Lakes*

Table 1 indicated that Atlantic offshore and crude oil is imported in the eastern and central regions of the country. Eastern Canada is dependent on foreign crude oil for a significant portion of its refinery production. Refineries in the Atlantic Provinces account for 40 per cent of Canadian crude petroleum imports, those in Quebec for 46 per cent and Ontario refineries for 14 per cent of imports. The ports of Come-by-Chance, Port Hawkesbury, Saint John and Quebec City are the major maritime centres that experience tanker traffic.

Transport Canada estimates that there are approximately 20,000 oil tanker movements off the coast of Canada each year. Of these, approximately 17,000 (85 per cent) are on the Atlantic coast. As a result of this concentration in shipping activity, Transport Canada conducted an environmental oil spill risk assessment project for the south coast of Newfoundland.<sup>9</sup> As shown in Table 4, spill rates for crude oil are greatest for small size spills while in port or at sea. In-port spills are primarily associated with loading/unloading spills that occur in the harbour or at piers, whereas spills at sea could occur at any point of the tanker's journey.

Spill Size (billion barrels)	Spill Rate, crude oil			Spill Rate, refined products		
	In Port	At Sea	Total	In Port	At Sea	Total
<b>1 to 49</b>	6.59	8.41	15	31.61	40.39	72
<b>50 to 999</b>	0.83	1.06	1.89	6.80	8.70	15.5
<b>1,000 to 9,999</b>	0.26	0.19	0.45	1.29	1.52	2.81
<b>10,000 to 99,999</b>	0.06	0.19	0.25	0.049	0.164	0.213
<b>100,000 to 199,999</b>	0.009	0.017	0.026	0.043	0.086	0.129
<b>&gt; 200,000</b>	0.031	0.063	0.094	0.022	0.043	0.065
Spills per billion (10 <sup>9</sup> ) barrels of oil transported						

*Table 4: Placentia Bay Tanker Spills: Historical Tanker Spill Rates for Crude & Refined Products*

The results of the Transport Canada risk analysis indicate that the most probable spill would be in the range of 1590 tonnes once every 27 to 33 years. The analysis concluded that the risk had decreased over the years, primarily due to increased preventive measures including the phase-in of double-hulled tankers, the requirements to have contracts with response organisations, and increased monitoring and inspection. For comparison purposes, Transport Canada noted that recent significant worldwide oil spills involved volumes much greater than the 1590 tonnes estimated to be probable in Placentia Bay an area of Canada with significant amount of existing tanker activity.<sup>10</sup>

An oil spill of 64,000 to 66,000 tonnes, as occurred in the *Prestige* spill in Spain in 2007, may occur once every 2000 years in Inner Placentia Bay. Although Canada has not experienced spills of the magnitude of the *Prestige* or *Exxon Valdez*, the size of the potential frequency and size of the spill are not the only important factors in determining significance. The location of a spill occurrence is also very important since it could impact an ecologically sensitive area. While this data from the oil spill risk assessment for the south coast of Newfoundland may not be representative of the level of absolute risk for all Canadian coastal locations, it nevertheless suggests the relatively limited risks associated with Canada's busiest oil tanker traffic region.

*Pacific Coast*

In addition to being a large importer to crude oil, Canada is also a large and growing net exporter of crude oil, and is likely to remain so for the foreseeable future with crude oil exported from western Canada leading the way.<sup>11</sup> The vast majority of Canada's oil reserves are found in Alberta (176.1 billion barrels of oil, or about 14 per cent of world reserves). In 2000, three-quarters of Canada's oil sands production was delivered to domestic refineries, all

of which are operating at or close to capacity. Increased oil sands production brings with it not only the possibility of existing pipeline capacity constraints but also increasing supply to existing markets, thereby significantly depressing the price compared to world markets. Bulk liquid crude exports using a Canadian west coast port represent an opportunity to solve the pipeline capacity problem, and simultaneously diversify the export market. While crude oil production growth in Alberta is not without its risks, it nevertheless represents a significant opportunity for a few west coast ports to expand their trade and diversify their markets.<sup>12</sup>

In Alberta, the various feeder pipelines that gather and move oil sands production from northern Alberta converge at two main hubs in the Edmonton region: the Trans Mountain Pipeline System (TMPL), operated by Kinder Morgan, moves crude oil to the Pacific coast, while Enbridge Pipelines Inc. is the major carrier of crude oil to eastern Canadian and US markets.

Implementing an oil tanker ban on the west coast to deal with the perceived environmental risks is problematic for a number of reasons. The 1150km-TMPL has been in operation since 1953, transporting crude oil and refined products from Edmonton to marketing terminals and refineries in Puget Sound (Washington state), and to the Westridge Marine Terminal (WMT) in Port Metro Vancouver, which is the only facility on Canada's west coast that can ship crude oil by ocean-going vessel.<sup>13</sup> Kinder Morgan Canada is expanding its capacity through a three-stage Trans Mountain Pipeline Expansion (TMX). Stage one involved constructing a 178km section of 32-inch pipe looping the east end of the TMPL and linking several pump stations, and tank facilities. Stage two brought increases in pipeline capacity by adding new pumping stations through to Port Metro Vancouver. In April 2012 Kinder Morgan announced the third stage: a \$5 billion expansion of its TMPL to more than double capacity on Canada's only oil artery to the west coast of North American and Asian markets. The planned TMX expansion would boost pipeline capacity to 850,000 barrels per day. The project may create the need for a second berth at WMT to accommodate Suexmax-sized tankers. If this project obtains regulatory approval tanker traffic at Port Metro Vancouver would increase from an existing average of five to ten vessels per month, to between 25 and 30 per month.<sup>14</sup>

Since there is only one established marine bulk oil terminal on the west coast, the recent legislative attempts to ban oil tankers on Canada's north Pacific coast effectively targets the new proposed Enbridge Pipelines' Northern Gateway project, which would transport crude oil and refined products from Edmonton to a marine marketing terminal at the Port of Kitimat. The Northern Gateway proposal represents both a cargo and market diversification opportunity for the port because it currently does not have a marine terminal that can ship crude oil by ocean-going vessel.<sup>15</sup> The project would require that a new 30-inch crude oil pipeline, bulk liquid crude storage facility and marine terminal be built. During operations, Northern Gateway expects between 190 and 250 oil and condensate tankers will call on the Kitimat Terminal each year, comprising 50 VLCC, 120 Suezmax tankers and 50 Aframax vessels.

### **Alternative measures to an outright tanker ban**

A review of the literature on the effectiveness of existing commitments pertaining to oil tanker movements provides a number of important findings that suggest appropriate policies to effectively deal with tanker risk issues, short of an outright ban. Two important risk management areas focus on oil spill prevention and oil spill response mitigation and amelioration measures.

Prevention of oil spills at the point of loading or discharge at a marine terminal is often a prime target for management action. Port Metro Vancouver required advanced notification for the movement of all tanker ships into the port's jurisdiction. In addition, the Pacific Pilotage Authority continues to respond to changing commercial practices and the use of larger vessels by introducing *Interim Operating Rules for Loaded Crude Oil Tankers in excess of 40,000 Dead Weight Tonnage* and updated procedures in 2010 for tankers transiting the Second Narrows, a busy shipping channel located in Port Metro Vancouver.<sup>16</sup>

Indeed, spill prevention measures are required even before a vessel arrives at a port. There are a number of existing policy measures such as ‘areas to be avoided’, ‘traffic separation schemes’, and ‘recommended navigational tracks’ for vessels that currently exist. The *International Tug of Opportunity System* is also effective in responding to situations that arise. Operating in the US/Canadian trans-boundary waters of the Strait of Juan de Fuca and Puget Sound, it also covers the coastline of British Columbia and provides information on the position and basic capabilities of ocean-going tugs, so that they are available if needed.

In contrast to a ban on tankers, Washington State has achieved a significantly lower spill rate from vessels compared to other key port states and in the United States as a whole. Lower spillage rates in these waters are attributable to mandated and voluntary best-achievable practice programs for vessel owners and operators in the state, and continuous efforts of the Washington State Department of Ecology in such activities as inspecting vessels, monitoring vessel response and spill preparedness plans, implementing pre-booming regulations for oil transfer operations, tug escort programs and conducting spill response drills and exercises. The effectiveness of these types of policy requirements is documented in the 2009 report *Oil Spill Risk In Industry Sectors Regulated by Washington State Department of Ecology Spills Program for Oil Spill Prevention and Preparedness* which noted that oil tankers have historically represented less than 4 per cent of the total spill risk while having a potential risk exposure of over 75 per cent due to cargo volume and frequency of tanker traffic.<sup>17</sup>

Spill prevention as an alternative policy measure to an outright tanker ban includes tug escort, enhanced navigational aids, expanded vessel traffic management systems, establishing environmental limits for safe operations and establishing places of refuge along each route. These types of policy measures are an important response to an increase in tanker traffic since the risk of a vessel grounding and human error are at the heart of risk exposure to the most significant impacts.

As an alternative, there is nothing to preclude certain specific trades (movements of bulk oil) being on-board Canadian flagged vessels, or a second registry as a legislative requirement of the coastal state. It would be totally within Canadian law to make this a legislative requirement and impose any restrictions or positive requirements on navigation on these Canadian tankers. For example, in the United States under the *Jones Act*, all tankers running between Alaska and the lower 48 states are American flagged tankers that meet US Coast Guard requirements. The US tankers also require large escort tugs moving through US waters when in close proximity to shore.

In addition to these preventive measures, public discussion could also be focused on protecting the most environmentally sensitive areas and managing the risks associated with all types of marine traffic, rather than banning a single type of vessel (oil tanker) over a large section of Canada’s coast. Much of the Canadian coastline is relatively remote, whether it is the coast of Newfoundland, Labrador, Nunavut or the west coast of British Columbia. On the west coast, which is the focus of this discussion, there is essentially a remote coastline with some very pristine waters that have not seen development except in a small number of locations in the lower portion of the coast.

There is no debate that oil accidentally released into the marine environment is a problem, as the world has seen in the 2010 Deep Horizon spill in the Gulf of Mexico. The long-term environmental impacts are still as yet unknown. This issue needs to be considered more fully and there are a variety of risk management procedures and approaches that can be used to minimise the potential pollution risk,

The adequacy of Canada’s mitigation and amelioration measures is a valid policy concern, even though Canada has not had a major oil spill in over 30 years since the *Nesueta* oil spill off the Oregon coast that washed onto Vancouver Island in 1989. While the absolute risk of a large oil tanker spill is low, the public is indeed right to be concerned with Canada’s response to large oil spills. The Canadian Coast Guard provides a supervisory function under existing Canadian legislation on pollution response. In the event of a major spill, the Canadian

government can take on a more active response role, though it is not clear it is effective in doing so. A report by the Commissioner of the Environment and Sustainable Development, released in 2010 on behalf of the Auditor General examined Canada's entire pollution prevention and response capabilities for oil from all ships (not just tankers). The report concluded that the government's oil pollution response capability over much of Canada's coast was lacking and needed to be addressed.<sup>18</sup> Stephen Brown, President of the Chamber of Shipping of British Columbia, reports that the shipping industry has recently been proposing to the federal and British Columbia governments the need for "significant improvement in the level of oil spill response capability on the coast."<sup>19</sup> While Transport Canada is currently working to address the Auditor General's concerns, progress remains slower than the announced pace of energy sector pipeline investment and marine terminal development.

In considering where to ban certain types of vessels, consideration needs to be given to the physical setting and lack of transportation infrastructure that make responding to any oil spill challenging, especially when a response is required in the north (i.e., above 60°). North. In terms of the effectiveness of existing spill response commitments the respective different standards for the marine transport of smaller amounts of oil by smaller vessels and the structure of British Columbia's spill response system appear to have played a part in the recovery efforts. The 2007 sinking of a barge loaded with logging equipment being transported between remote logging locations included a fuel truck containing 10,000 litres of diesel being sent to the sea bottom near environmentally sensitive Robson Bight off the north east coast of Vancouver Island.

### **Policy implications**

While a ban on crude petroleum tanker traffic may hold some initial appeal policy makers must carefully consider the economic trade-offs involved in shipping cargoes at sea against the storage, handling, port requirements and environmental risks associated with the trade. A 2012 MacDonald Laurier Institute report *Making oil and water mix: Oil tanker traffic on Canada's West Coast* estimated that the national economic benefits of a pipeline and port project on the West Coast would be nullified if a ban on tankers were introduced. The foregone benefits would include increased GNP of \$270 billion, revenues to government of \$81 billion, and some 558,000 person-years of employment. In addition, an oil tanker ban would mean forfeiting a nationally important opportunity to further diversify Canada's trade and investment relationships with Asia, the world's largest and fastest growing economic region.<sup>20</sup>

A ban on tanker traffic on Canada's west coast without stakeholder consultations, or substantive regulatory impact analysis, could provoke policy or commercial concerns from Canada's major trading partners. Legislative action to ban certain types of shipping traffic in one area could call into question Canada's resolve to honour existing commitments. A large-scale west-coast ban on tanker traffic would no doubt contradict the cooperative spirit that underpins international commercial shipping.

This article seeks to facilitate the best possible public policy for Canada as a trading and maritime nation and as a country that endeavours to protect its marine environment. Essentially, the issue is one of balancing of the freedom of navigation with the coastal state's right to protect its marine environment. There are mechanisms and procedures to do this that win the support of the international community. The international agreements and legislative and administrative processes have generally worked well to protect and prevent marine pollution. Yet the pace of current Canadian energy sector developments and the transparency of existing processes leave room for improvement. In their paper *The Maritime Transport of Canadian Crude Oil*, Anderson and Spears provide a number of policy recommendations to deal with the risks associated with increased tanker traffic without resorting to a tanker ban. Alternatives include greater public involvement and transparency in project specific risk assessments; mandated and voluntary best practices in port authority and marine terminal procedures (as done in Washington State); and the creation of an independent agency

responsible for conducting oil spill risks assessments and directing investments in spill prevention and response.<sup>21</sup>

The impact of a proposed tanker ban arising from new energy international trade opportunities from Alberta's oil sands on Canada's northwest Pacific coast is only one part of the full policy context that needs to be considered. Since there is one established marine bulk oil terminal on the southwest coast of British Columbia the recent proposed tanker ban legislation is effectively targeting the proposed Enbridge Pipeline Inc Northern Gateway project. An ad hoc tanker ban in one area of Canadian waters is hard to justify given that the TMPL has been handling tankers since 1953 without incident. Banning oil tanker traffic on Canada's northwest coast would run counter to the way shipping risks are managed in the one geographic location where growth in crude oil trade is most likely to occur: British Columbia.

Finally, no consideration of Canadian policy in this subject would be complete without an examination of the dependency and economic impact of both large and small bulk fuel deliveries (by tanker vessels of varying sizes and by barge). These implications of Canadian oil tanker traffic need to be considered in developing a coherent and consistent policy response that both meets the test of Canada's energy security requirements, and existing international and domestic legal and policy commitments.

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<sup>1</sup> D Anderson, 'The Effect of Port State Control on Substandard Shipping', *Maritime Studies*, July/August, 2002, p. 25.

<sup>2</sup> Statistic Canada, *The Supply and Disposition of Refined Petroleum Products in Canada*, Government of Canada, Ottawa, 2010.

<sup>3</sup> Transport Canada, *Transportation in Canada 2009*, Government of Canada, Ottawa, 2010.

<sup>4</sup> Statistics Canada, *Shipping in Canada 2008*, Government of Canada, Ottawa, 2010.

<sup>5</sup> E Ranheim, *Tanker safety*, retrieved 4 May 2012, <<http://www.imsf.info/documents/IntertankoRanheimIMSF2010.pdf>>.

<sup>6</sup> TANKEROperator, 'Annual Review' March 2012 p. ix.

<sup>7</sup> Atlantic Pilotage Authority, *Atlantic Pilotage Authority Annual Report 2009*; Laurentian Pilotage Authority, *Incident Reporting – Safety and Marine Occurrences 2009*; Great Lakes Pilotage Authority, *Great Lakes Pilotage Authority Annual Report 2009*; and Great Lakes Pilotage Authority, *Great Lakes Pilotage Authority Annual Report 2009*.

<sup>8</sup> Transportation Safety Board of Canada, *Annual Reports* (various), retrieved between June 2011 and September 2011, <[www.tsb.gc.ca/eng/publications/index.asp](http://www.tsb.gc.ca/eng/publications/index.asp)>.

<sup>9</sup> Transport Canada, *TP Synopsis Report – Environmental Oil Spill Risk Assessment for the South Coast of Newfoundland*, TP 14740E. Edition 1, 2007

<sup>10</sup> Transport Canada, *Environmental Oil Spill Risk Assessment Project*, retrieved 4 May 2012 <<http://www.tc.gc.ca/eng/marinesafety/oep-ers-regime-study-1470.htm>>.

<sup>11</sup> International Energy Agency, *Oil & Gas Security Emergency Response of IEA Countries – Canada*. 2010.

<sup>12</sup> D Anderson, 'Midstream Opportunities and Challenges for Canada's West Coast Ports'. *40<sup>th</sup> proceedings of the Canadian Transportation Research Forum*. 2005.

<sup>13</sup> Kinder Morgan Canada, *Trans Mountain Expansion (TMX) PROPOSAL*, 2011.

<sup>14</sup> G. Hamilton & B Morton, B, 'Kinder Morgan to proceed with \$5-billion Trans Mountain pipeline expansion to Burnaby', retrieved 13 April 2012 <<http://www.vancouversun.com/business/energy/Kinder+Morgan+proceed+with+billion+Trans+Mountain+pipeline+expansion/6449009/story.html>>.

<sup>15</sup> T Gilje, J Dinwoodie & J Challacombe, 'Crude Carrier Consolidation and Capital Cost', *International Journal of Maritime Economics*, vol. 4, #1 2002, pp. 35-45.

<sup>16</sup> Port Metro Vancouver, 'Second Narrows Transit Procedures', retrieved 4 May 2012 <[www.portmetrovancover.com/en/users/marineoperations/navigation/SecondNarrowsTransitProcedures.aspx](http://www.portmetrovancover.com/en/users/marineoperations/navigation/SecondNarrowsTransitProcedures.aspx)>.

<sup>17</sup> D Etkin, *Oil Spill Risk in Industry Sectors Regulated by Washington State Department of Ecology Spills Program for Oil Spill Prevention and Preparedness*, 2009.

<sup>18</sup> Office of the Auditor General of Canada, 'Report of the Commissioner of the Environment and Sustainable Development' of the House of Commons. Chapter 1, *Oil Spills from Ships*, 2010.

<sup>19</sup> Personal communication with Captain Stephen Brown, President, Chamber of Shipping of British Columbia January 17, 2012.



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<sup>20</sup>MacDonald Laurier Institute, *Making Oil and Water Mix: Oil Tanker Traffic on Canada's West Coast*, retrieved 4 May 2012 < [www.macdonaldlaurier.ca/files/pdf/OilTankerBan-FINAL.pdf](http://www.macdonaldlaurier.ca/files/pdf/OilTankerBan-FINAL.pdf)>.

<sup>21</sup> D Anderson & J Spears, 'The Maritime Transport of Canadian Crude: Improving Sustainability in the Age of Occupy Wall Street Protests, 47<sup>th</sup> *proceedings of the Canadian Transportation Research Forum*. 2012.